ARTICLE IN PRESS

Preventive Veterinary Medicine xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed

SVEPM 2017—Recent developments and contemporary foci in veterinary epidemiology and economics, Society of Veterinary Epidemiology and Preventive Medicine conference Inverness, Scotland 29–31 March 2017

The 2017 Annual Meeting of the Society for Veterinary Epidemiology and Preventive Medicine (SVEPM), held in Inverness, Scotland, highlighted recent developments and contemporary foci in veterinary epidemiology and economics. Workshops included: aquaculture and epidemiology; risk assessment of vector-borne diseases; reporting guidelines for observational studies; systems thinking for disease management; techniques to teach epidemiology; and infectious disease modelling with SimInf. From within the conference programme, the five papers contained in this Special Issue of Preventive Veterinary Medicine demonstrate the excellent platform for networking between veterinary epidemiologists, public health professionals, economists and aligned professionals which this conference provides.

Topics include the use of stochastic simulation modelling to investigate the efficacy of risk mitigating scenarios to maintain disease free status for Infectious Bovine Rhinotracheitis (IBR), budgetary and implementation impacts of changing control strategy from mandatory towards indirect testing for Bovine Viral Diarrhoea (BVD), the effects of imperfect testing regimes upon disease frequency and association with hypothetical exposures using *Staphylococcus aureus* and coagulase negative staphylococci (CNS), differences in identification of antimicrobial resistance (AMR) based upon choice of method, and environmental and demographic factors driving Porcine Reproductive and Respiratory Syndrome virus (PPRSv) including the quantification of its spatial variation across the United States of America (U.S.A.).

Maintenance of freedom from Bovine Herpes Virus type 1 (BoHV1) circulation (which causes IBR) in Dutch cattle, in the face of cattle imports, was investigated using a stochastic simulation model by Santman-Berends et al. The model predicted basic risk and evaluated the efficacy of risk mitigating scenarios which included testing prior to import, import restrictions and vaccination. The model suggested that IBR infected animals are regularly imported, with an estimate of 571 herds affected upon import, mostly due to latent infections. It also suggested that acutely infected imported animals would mostly impact veal herds. The scenarios most successful in reducing import risk included allowing importation only from countries with a certain disease status, or vaccinating calves combined with testing older cattle; the latter being most feasible for stakeholders. Importation risk seemed most reduced by combining testing and vaccination strategies.

BVD, a major production disease of cattle, can be vertically transmitted. Transient postnatal infections lead to immunologically protected cattle. However, during a pregnancy window, in utero embryo infection can occur leading to persistently infected (PI) calves; a major risk for BVD spread, but also an efficient target for control. Strategies to identify PI animals for removal include tissue tag testing and serological screening. Since 2013, all Irish new born calves are mandatorily tissue tag tested for BVD, reducing PI incidence substantially. Recently, stakeholders including farmers have been interested, due to potential cost savings, in using an indirect testing strategy. Thulke et al. helped to inform this debate. They quantified the expected strategic, budgetary and implementation benefits of strategy change by reviewing national eradication programme data and strategy performance predictions from an expert system model. They identified some drawbacks to changing strategy including a loss of epidemiological information to allow real-time monitoring of eradication progress, and reduced effectiveness in terms of time to eradication because PI removal would not be enforced, and some positive costs savings for 28% of herds. However, these were negligible in half of the cases.

Haine et al. also explored the impact of imperfect testing regimes, in relation to udder health in a simulated hypothetical cohort study and scenarios describing *S. aureus* and CNS. They evaluated the relative impact of selection and misclassification biases resulting from incident intramammary infection (IMI) misclassification on measures of (IMI) disease frequency (incidence) and of association with hypothetical exposures (odds ratio; OR), estimated using Markov Chain Monte Carlo simulations. For the *S. aureus* scenario, a pathogen with a low incidence, biases were small for disease incidence. In contrast, diagnostic errors led to important selection and misclassification biases for CNS, which have a high incidence. The OR for association with exposure also showed little bias for *S. aureus*, compared to large misclassification bias for CNS, which showed little improvement when varying sampling strategies to improve test sensitivity or specificity, or using a two out of three interpretation for IMI definition. The authors concluded that increasing sampling or testing can prevent bias in some situations but efforts can be spared in others. When designing longitudinal studies, evaluating potential biases and best sampling strategy is as critical as the choice of diagnostic test.

AMR increasingly threatens global public health, with unquantified bidirectional transmission in humans, animals and the environment. Appropriate measurement of resistance is needed to quantify rates of transmission and assess the costs and benefits of reduced antimicrobial usage in livestock. In their study, Humphry and others explored differences in the identification of ampicillin and nalidixic acid resistance in cattle or sheep faeces, arising from choice of measurement, including screening samples by "streaking" direct culture on to treated plates, and determining minimum inhibitory concentration (MIC) using published thresholds and individual isolates. Direct culture resulted in more than double the number

https://doi.org/10.1016/j.prevetmed.2017.11.024

of resistant samples quantified than using the MIC method for ampicillin. But how useful for re-estimating prevalence from previous work (in which "streaking" was applied), is the observed relationship between these resistance measures? The authors estimated that AMR prevalence would have been considerably lower in the historic study had the MIC method been utilised, when they applied boot-strap methods. They concluded that there is no single way of defining a sample as resistant to an antimicrobial agent, which highlights the importance of establishing the most appropriate measure of AMR when a study is proposed.

Alkhamis et al. investigated the influence of environmental and demographic factors upon endemic PRRSv outbreaks in swine producing regions in the U.S.A. using presence-only Maximum Entropy (Maxent) species distribution modelling. Having developed high-risk area maps for PRRSv, the extent to which hypothesised factors influenced regional risk was assessed. Pig density had the relatively highest contribution in densely pig-populated areas, whereas climate and land cover were important when pig densities were low. This study is the first in the peer-reviewed literature to quantify the spatial variation and relative contribution of these risk factors across different swine production regions in the U.S.A. The results have implications for the design and implement of early detection, prevention, and control strategies for PRRSv in the U.S.A.

This special issue of Preventive Veterinary Medicine presents research developments which embrace knowledge sharing to improve the health of animals, humans and the environment. The members of the local organising committee in Inverness are thanked for hosting an excellent conference in a superb location. We greatly acknowledge all reviewers for their help in evaluating manuscripts submitted to this special issue of Preventive Veterinary Medicine.

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